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PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Hannigan

Application No.: 09/543,125

Filed: April 5, 2000

For: INTERNET-LINKING SCANNER

Examiner: Daniel Hess

Date: May 12, 2003

Art Unit 2876

Confirmation No. 7024

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APPEAL BRIEF

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Sir:

This brief is in furtherance of the Notice of Appeal filed March 11, 2003. Please charge the fee required under 37 CFR 1.17(f) or any deficiency to deposit account 50-1071 (see transmittal letter).

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I. REAL PARTY IN INTEREST

The real party in interest is Digimarc Corporation, by an assignment from the inventors recorded at Reel 11118, Frames 370-371, on August 7, 2000.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 3, 6, 7, 9, 10, 13-16, 19-21, and 23 are rejected, and claims 4, 5, 8, 17, 18, 22 and 24 are objected-to.[1] These actions were appealed.

Claims 1, 2, and 11-12 have been canceled.

IV. STATUS OF AMENDMENTS

All earlier-filed amendments have been entered.

V. SUMMARY OF THE INVENTION

Applicant's invention relates to improved handheld scanners that provide certain additional (e.g., steganographic decoding, internet linking) capabilities.

According to one aspect, the invention is an improvement to known handscanners that have 3 optical sensor arrays: one a linear (1D) sensor, and two 2D sensors.[2] As is known in the art (e.g., from the HP CapShare scanner), the 2D sensors collect data that is analyzed to track movement of the scanner across a surface (i.e., they serve in a motion sensing capacity).[3] The 1D sensor acquires image data.[4] This 1D image data is processed by an internal CPU – in conjunction with motion data from the 2D sensors – to yield final scan data that takes into account the scanner's path of transit across the surface being scanned.[5]

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1 The rejection failed to mention claims 6 and 13 on its cover sheet, and the Notice of Appeal likewise failed to mention these claims.

2 *See, e.g.*, specification, page 2, lines 9-18.

3 *See, e.g.*, specification, page 2, lines 26-30

4 *See, e.g.*, specification, page 2, lines 22-25.

5 *See, e.g.*, specification, page 3, lines 2-5

To the foregoing known arrangement, applicant has added extra functionality. In one arrangement, the scanner discerns a machine-readable identifier from the scan data.[6] Additionally, the internal CPU uses the data from the 2D sensors for a purpose *in addition to* sensing scanner motion. For example, this additional purpose can be:

- beginning a watermark detection process,[7] or
- beginning to sense a watermark calibration signal,[8] or
- identifying portions of the 1D sensor data that are relatively more likely to include detectable identifier data,[9] or
- quantifying an object surface characteristic so that a filter can be applied to scan data in accordance therewith,[10] or
- assessing a relative distance to the object from different portions of the scanner,[11] or
- quantifying an affine distortion in the scan data, so that compensation may be applied therefore.[12]

(A watermark is data that is hidden ("steganographically encoded") within some other data set. Thus, for example, a printed magazine advertisement may be steganographically encoded with a watermark that conveys an internet address associated with the advertised product. (The encoding can take the form, e.g., of subtle shifts in pixel luminance or chrominance.) A watermark reader can sense these subtle changes and discern the internet address encoded thereby. This address information can be passed to an internet browser device, and used to view a web page at the specified address.)[13]

According to a further aspect, the invention improves on known handscanners by equipping the scanner with the ability to discern a steganographically encoded digital watermark from the scan data.[14]

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6 *See, e.g.,* specification, page 3, lines 14-16; page 6, lines 17-18.
7 *See, e.g.,* specification, page 4, lines 14-20.
8 *Ibid.*
9 *See, e.g.,* specification, page 4, line 24 through page 5, line 5.
10 *See, e.g.,* specification, page 4, lines 21-23.
11 *See, e.g.,* specification, page 5, lines 22-23.
12 *See, e.g.,* specification, page 5, lines 14-17.
13 *See, e.g.,* specification, page 1, lines 6-15.
14 *See, e.g.,* specification, page 3, lines 14-16.

According to yet another aspect, the invention improves on known handscanners that include a visual output device,[15] by provision of a programmed CPU that employs a first technique to examine the scan data for the possible presence of steganographic watermark data and, if found, then employs a second technique to attempt to decode plural bits of steganographic watermark information from the scan data.[16] (The first technique can be, e.g., examining the scan data for the presence of a calibration signal,[17] or examining frequency content of the scan data.[18])

According to still another aspect, the invention improves on known handscanners that include a visual output device that is controlled – at least in part – by information decoded from the scan data.[19] The improvement includes provision of a programmed CPU that employs a first technique to examine the scan data for attribute information (e.g., frequency content[20] or texture information[21]) useful in guiding possible subsequent decoding of the scan data to discern watermark information therefrom, and employs a second technique to attempt to decode the watermark information – the second technique being determined in part by the attribute information.[22]

According to yet another aspect, the invention improves on known handscanners of the sort just described, by the provision of a programmed CPU that employs a first technique to identify one or more portions of the scan data that appear most promising for decoding steganographic watermark data therefrom (e.g., area "A" in Fig. 2),[23] and employs a second technique for attempting to decode such a watermark – the second technique particularly considering a portion of scan data identified by the first technique.[24]

According to still another aspect, the invention improves on known handscanners of the sort just described, wherein the scanner includes two spaced-apart sensor arrays, and the CPU is arranged to exploit the different views of the object being scanned to improve the

15 *See, e.g.*, specification, page 2, line 15.
16 *See, e.g.*, specification, page 3, lines 16-23.
17 *See, e.g.*, specification, page 3, line 18.
18 *See, e.g.*, specification, page 6, lines 5-16.
19 *See, e.g.*, specification, page 4, lines 6-8.
20 *See, e.g.*, specification, page 6, lines 5-16.
21 *See, e.g.*, specification, page 4, line 21.
22 *See, e.g.*, specification, page 4, lines 22-23.
23 *See, e.g.*, specification, page 6, lines 5-10.
24 *See, e.g.*, specification, page 6, lines 8-10.

decoding of information from the scan data.[25] (E.g., the CPU may determine an optically-sensed attribute corresponding to each of the sensor arrays, and use such attribute in determining a compensation to be applied to the scan data before decoding of the watermark data.[26])

VI. ISSUES

1. Did the Office establish *prima facie* obviousness of claim 3 when none of the cited art teaches or suggests the use of 2D sensor for a purpose *other* than motion sensing, as required by the claim?

2. Did the Office establish *prima facie* obviousness of claims 6, 7 and 9, when none of the cited art teaches or suggests the limitations added by these claims?

3. Did the Office establish *prima facie* obviousness of claims 10 and 16, when the cited art fails to suggest the selective modifications and combinations needed to yield the claimed combinations?

4. Did the Office meet its burden under Section 103 when its rejection of claims 13-15 did not address the limitations of those claims?

5. Did the Office establish *prima facie* obviousness of claims 19, 20, 21 and 23 when none of the cited art teaches or suggests limitations of these claims?

VII. GROUPING OF CLAIMS

Each of the claims is independently patentable, for reasons detailed below.

VIII. ARGUMENT

1. Claim 3

Claim 3 stands rejected over the Jepson preamble, in view of Wang (5,790,703).

The claim is patentable because the Examiner failed to establish prima facie obviousness of an arrangement in which "*said software instructions cause the CPU **to process***

[25] *See, e.g.,* specification, page 4, lines 14-16.
[26] *See, e.g.,* specification, page 5, lines 14-17.

data from the 2D sensor arrays for a purpose in addition to sensing scanner motion, *"* as required by the claim.

The cited Wang art teaches a digital watermarking method using conjugate halftone screening.

In the arrangement recounted in the Jepson preamble, a known scanner (i.e., the Hewlett-Packard CapShare scanner) includes:

- a linear sensor array; and
- two 2D sensor arrays serving as motion encoders.

The prior art Hewlett-Packard CapShare scanner is designed so that users will employ the scanner's ***linear*** sensor array to sense optically encoded data from substrates. The ***2D sensors*** are provided for motion sensing purposes *exclusively*. Applicant's specification explains:

> *The two 2D CCDs 18a, 18b, are spaced apart, adjacent the linear sensor, and are used to track the scanner's movement. The areas scanned by these CCDs are illuminated obliquely by IR light, highlighting microscopic media surface features. The CPU identifies patterns in the surface features detected by each of these CCDs, and tracks their movement from one frame to the next to discern the movement of the two CCDs. By knowing the movement of the two CCDs, the movement of the scanner itself can be determined. This scanner motion information is used to re-map the swathed scan data acquired from the linear scanner array into composite pixel data with uniform scanline spacing.*[27]

In support of his rejection, the Examiner states, "*The existence of such watermarks implies the necessity of a programmed scanner to decode them.*" However, an artisan confronted with Wang and the prior art CapShare scanner, would have employed the ***1D sensor array*** for watermark capture purposes, and left the 2D sensors for their intended purpose of motion sensing alone. Nothing in Wang, CapShare, or any other art, suggests using the twin 2D sensors in the scanner for any purpose other than motion sensing.

Since there is no teaching or suggestion in the art that would have led an artisan to employ the 2D sensors of the Jepson preamble for a purpose other than sensing scanner motion, a prima facie case of obviousness of claim 3, and claims 6-9 dependent thereon, has not been established, so allowance of such claims is solicited.

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27 Specification, page 2, line 26 through page 3, line 4.

2. **Claims 6, 7 and 9**

Claims 6, 7 and 9 are allowable for their dependence on allowable base claim 3. Additionally, these claims are independently patentable.

These claims stand rejected on the same rationale as claim 3 (Jepson preamble and Wang), and further in view of Cherry.

Claim 6 adds to claim 3 the requirement, "said purpose includes identifying portions of the data collected by the linear sensor array *that are relatively more likely to include detectable identifier data.*"

Cherry teaches (e.g., Fig. 4A), a pattern by which a laser may scan an item so as to sense barcode data. As noted by the Examiner, about 8% of the total area is scanned.

It should be noted that a barcode occupies *two* dimensions of space, but can be fully read *from a single line scan* that passes along any line from one side to the other. Thus, barcode scanning does not present the same conundrum addressed by applicant of locating portions that appear most promising for decoding encoded data.

Put another way, Cherry's scan pattern in Fig. 4A does not attempt to identify portions that are most promising for conveying encoded data. Rather, Cherry's Fig. 4A pattern employs a brute force approach – scanning all regions. The 8% figure reflects that fact that a brute force search for a bar code can scan less than 100%, since *any* single line across the 2D barcode will suffice to read the data.

Since Cherry scans the totality of an object, looking for a barcode marking, it does not teach the limitation introduced by claim 6.

(Moreover, the posited combination of Jepson preamble, Wang, and Cherry to yield the arrangement of claim 6, relies strikingly on hindsight reconstruction, rather than a teaching or suggestion in the art.)

Claim 7 adds to the scanner of claim 3 the requirement, "*said purpose is to quantify an object surface characteristic, wherein a filter can be applied to said scan data in accordance therewith.*"

The Examiner makes reference to Cherry's Fig. 12C showing scanning of a curved object, and makes cryptic reference to an unexplained "Tracy."[28] However, nothing in Cherry is understood to teach or suggest applying a filter to scan data in accordance with a quantified object surface characteristic.

Again, the rejection fails to meet the Office's prima facie burden of establishing obviousness.

Claim 9 adds to the scanner of claim 3 the requirement, "*said purpose is to quantify an affine distortion in the scan data, so that compensation may be applied therefore.*"

Again, Cherry is not understood to teach or suggest quantifying an affine distortion of scan data, so that compensation can be applied.

Again, the Examiner's cryptic rationale does not meet the Office's prima facie burden:

> *"In view of the teaching of Cherry, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the old and well-known versatility in scanning through software in the teachings of the applicant disclosed in discussion of prior art as modified by Tracy because it increases the likelihood of successful scanning."*

In view of the foregoing, the rejections of claims 6, 7 and 9 should be reversed.

3. **Claims 10 and 16**

Claims 10 and 16 stand rejected over their Jepson preambles, in view of Rhoads (6,345,104).

Rhoads teaches a digital watermark.

The stated rationale in support of the proposed combination of claim 10 is:

> *In view of Rhoads's teaching it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the prior art scanner to scan watermarks that are steganographically encoded using keys as taught by Rhoads because such watermark detection can extract valuable cryptographically hidden data in a document.*

As with claim 3, there is nothing in Rhoads that teaches or suggests the proposed alteration of the admitted prior art scanner to yield the arrangement defined by claim 10. Rather, hindsight seems – again - to have been impermissibly employed.

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[28] *See* rejection, last line of page 3.

Likewise, the stated rationale in support of the proposed combination of claim 16 is:

> *In view of Rhoads's teaching it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the old and well-known calibration data holding information to decode a steganographically encoded watermark as taught by Rhoads into the prior art admitted by the applicant because this two-step process results in more secure encoding.*

Again, whatever other merits this statement may have, it does not justify the proposed combination of prior art to yield the scanner of claim 16. Indeed – the rationale seems to hinge on a result of "more secure encoding." Security of encoding is not what claim 16 is about (and it is not clear that the arrangement of claim 16 provides any security).

Again, the rejections are not statutorily sufficient and should be reversed.

4. Claims 13-15

Independent claim 13, and claims 14, 15 dependent thereon, stand rejected over the Jepson preamble, in view of Wang and Rhoads.

The rejection is flawed as not addressing the limitations of the claims.

The Examiner's rejection notes, "*The prior art admitted by the applicant as modified by Wang fails to show identifying portions that are more likely to include detectable id data.*" However, claim 13 does not require "*identifying portions that are more likely to include detectable id data.*" The rejection doesn't address the claim.

The rejection continues (last paragraph on page 6, first paragraph on page 7) by referring to Cherry and his teachings. However, Cherry does not seem to form the basis for the rejection (which is said to be Jepson + Wang + Rhoads). Again, the rejection does not address the claim.

It appears, instead, that the rejection of claim 13 has repeated the language rejecting claim 6 – although these improvement claims are characterized by different limitations.

The rejection of claim 13 is also off-point. It states:

> *In view of Rhoads's teaching it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the prior art scanner to scan watermarks that are steganographically encoded using keys as taught by Rhoads because such watermark detection can extract valuable cryptographically hidden data in a document.*

Again, this language seems to have been copied from the rejection of another claim (in this case, claim 16), although the limitations of claim 13 are different than the limitations of claim 16.

In view of the foregoing, the rejection of claim 13 – and claims 14, 15 dependent thereon – should be reversed.

Claim 15 requires that "*the first technique comprises examining a frequency content of said scan data.*"

This claim is rejected by the assertion:

> *Re claim 15: Rhoads uses color images. Thus scanning must involve collection of color images.*

Again, the Office's burden under Section 103 is not met by such a statement.

Since no prima facie case has been established as to claim 13, the merits of claims 14 and 15 are not further belabored.

5. **<u>Claims 19-24</u>**

Claims 19-24 stand rejected over their respective Jepson preambles, in view of Cherry and Rhoads ('082).

Independent claim 19 requires that the claimed CPU:

> *employ a first technique to identify one or more portions of said scan data that appear most promising for decoding steganographic watermark data therefrom; and*
> *employ a second technique to attempt to decode plural-bits of steganographic watermark information from the scan data, said second technique particularly considering a portion identified by the first technique.*

As noted above in connection with claim 6, Cherry does not identify portions of the scan data that "appear most promising..." Instead, Cherry's barcode scanning system is exhaustive. His laser illumination traces a path so extensive that it will find a barcode, wherever it may be located. No "promising" portions are identified, and thereafter particularly considered.

Claim 20 is patentable for its dependence on claim 19, and is independently patentable as well. Claim 20 adds that requirement that:

> *the first technique comprises identifying a portion of said scan data that is sampled at a higher sampling rate than other portions.*

(The sampling at higher sampling rate is illustrated, e.g., by the region "A" in Fig. 2 of the specification.)

Contrary to the Examiner's assertion, Rhoads does not teach such an arrangement.

Moreover, the Action transforms the claim requirement into something different in an attempt to base the rejection on Rhoads. The Action notes:

> *It is clear that the first step of Rhoads '082 would have to involve a less-dense data evaluation than the second step, because otherwise there is no advantage to be gained by having a first sweep over a broad area followed by a second sweep in a more focused area.*

"Less dense data evaluation" is not what the claim requires. Rather, claim 20 requires identifying a portion of the scan data that is sampled at a higher sampling rate than other portions. Rhoads does not teach or suggest this.

Independent claim 21 is an improvement over known scanners wherein:

> *the scanner comprises two spaced-apart multi-element sensor arrays; and said [CPU] program instructions cause said CPU to exploit the different views of an object being scanned to improve the decoding of information from said scan data.*

The rejection is premised on the claim preamble and Wang (which, as noted, shows a halftone watermarking method), further modified by Katoh.

Katoh discloses a barcode scanner (e.g., for a supermarket) that emits scanning beams out two windows.

The rejection is ill-founded on a number of grounds.

First, the Jepson preamble of claim 21 does not teach or suggest "two spaced-apart multi-element sensor arrays" as required by the claim. The preamble recites only one multi-element sensor array.

The Jepson preambles of other claims (e.g., claim 1) recite two spaced-apart 2D sensor arrays. However, as noted above, such prior art use of twin 2D sensor arrays is *exclusively* for sensing motion of a scanner - not for decoding information from an object being scanned, as presently claimed.

Katoh's uses two scanning windows not to achieve any advantageous binocular-based effect. Rather, Katoh scans out two windows in order to be more forgiving in placement of the articles being scanned ("The object of the present invention is to easily read bar codes without being affected by the position at which they are attached to an object that is to be read..."[29]).

Moreover, Katoh indicates that only a single window is used at a time. Scanning out both windows simultaneously is taught *against* by Katoh to avoid undesired interference ("Two sets of laser beam sources are alternatingly turned on after each time T, and the reflected light is detected by the light-receiving elements to read the bar codes, *while eliminating the noise (interference) caused by the other scanning beam*"[30]).

Still further, it will be recognized that the selective modification and excerpting of teachings from the disparate art is an impermissible use of hindsight and is not suggested by the art.

Claim 23 is allowable for its dependence on claim 21, and is also independently allowable. No rationale attempting to justify the requisite modification to the cited art to yield the scanner of claim 23 was provided in the rejection.

IX. CONCLUSION

In view of the foregoing, the rejections of claims 3, 6, 7, 9, 10, 13-16, 19-21 and 23 should be reversed.

Respectfully submitted,

DIGIMARC CORPORATION

Date: May 12, 2003

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29 Katoh, col. 2, lines 31-33.
30 Katoh, col. 6, lines 9-14.

APPENDIX – PENDING CLAIMS

3. In a scanner including a CPU, a memory, a linear sensor array, and first and second spaced-apart 2D sensor arrays serving as motion encoders, the CPU serving to process raw scan data collected by the linear sensor array from an imaged object into final scan data in accordance with scanner motion data provided from said 2D sensors, an improvement comprising software instructions in the memory causing the scanner to discern a machine-readable identifier from scan data acquired from the object, wherein said software instructions cause the CPU to process data from the 2D sensor arrays for a purpose in addition to sensing scanner motion.

4. The scanner of claim 3 in which said purpose includes beginning a watermark detection process before data from the linear sensor array is finally processed.

5. The scanner of claim 4 in which said purpose includes beginning to sense a watermark calibration signal.

6. The scanner of claim 3 in which said purpose includes identifying portions of the data collected by the linear sensor array that are relatively more likely to include detectable identifier data.

7. The scanner of claim 3 in which said purpose is to quantify an object surface characteristic, wherein a filter can be applied to said scan data in accordance therewith.

8. The scanner of claim 3 in which said purpose is to assess relative distance to the object from different portions of the scanner.

9. The scanner of claim 3 in which said purpose is to quantify an affine distortion in the scan data, so that compensation may be applied therefor.

10. In a scanner including a CPU, a memory, a linear sensor array, and first and second spaced-apart 2D sensor arrays serving as motion encoders, the CPU serving to process raw scan data collected by the linear sensor array from an imaged object into final scan data in accordance with scanner motion data provided from said 2D sensors, an improvement comprising software instructions in the memory causing the scanner to discern a machine-readable identifier from scan data acquired from the object, wherein said identifier is steganographically encoded as a digital watermark.

13. In a scanner comprising a multi-element sensor array, a memory, a CPU, and a visual output device, the scanner producing scan data from signals provided from the sensor array, the memory including program instructions causing the CPU to control the visual output device, at least in part, in accordance with information decoded from the scan data, an improvement wherein the program instructions further cause the CPU to:

employ a first technique to examine said scan data for the possible presence of steganographic watermark data; and

if such possible presence is found, employ a second technique to attempt to decode plural-bits of steganographic watermark information from said scan data.

14. The scanner of claim 13 in which the first technique comprises examining said scan data for the presence of a calibration signal

15. The scanner of claim 13 in which the first technique comprises examining a frequency content of said scan data.

16. In a scanner comprising a multi-element sensor array, a memory, a CPU, and a visual output device, the scanner producing scan data from signals provided from the sensor array, the memory including program instructions causing the CPU to control the visual output device, at least in part, in accordance with information decoded from the scan data, an improvement wherein the program instructions further cause the CPU to:

employ a first technique to examine said scan data for attribute information useful in guiding possible subsequent decoding of the scan data to discern plural-bit steganographic watermark information therefrom; and

employ a second technique to attempt to decode plural-bits of steganographic watermark information from said scan data, said second technique being determined at least in part by said attribute information.

17. The scanner of claim 16 wherein the first technique comprises examining a frequency content of said scan data.

18. The scanner of claim 16 wherein the first technique comprises examining said scan data to determine texture information.

19. In a scanner comprising a multi-element sensor array, a memory, a CPU, and a visual output device, the scanner producing scan data from signals provided from the sensor array, the memory including program instructions causing the CPU to control the visual output device, at least in part, in accordance with information decoded from the scan data, an improvement wherein the program instructions further cause the CPU to:

employ a first technique to identify one or more portions of said scan data that appear most promising for decoding steganographic watermark data therefrom; and

employ a second technique to attempt to decode plural-bits of steganographic watermark information from the scan data, said second technique particularly considering a portion identified by the first technique.

20. The scanner of claim 19 wherein the first technique comprises identifying a portion of said scan data that is sampled at a higher sampling rate than other portions.

21. In a scanner comprising a multi-element sensor array, a memory, a CPU, and a visual output device, the scanner producing scan data from signals provided from the sensor array, the memory including program instructions causing the CPU to control the visual

output device, at least in part, in accordance with information decoded from the scan data, an improvement wherein:

the scanner comprises two spaced-apart multi-element sensor arrays; and

said program instructions cause said CPU to exploit the different views of an object being scanned to improve the decoding of information from said scan data.

22. The scanner of claim 21 wherein said program instructions cause the CPU to determine an optically-sensed attribute corresponding to each of the spaced-apart multi-element sensor arrays, and to use said attribute in determining a compensation to be applied to said scan data prior to decoding of the information therefrom.

23. The scanner of claim 21 wherein said program instructions cause the CPU to attempt to decode plural-bit steganographic watermark information from said scan data, exploiting said different views.

24. The scanner of claim 23 wherein said program instructions cause said CPU to sense calibration signals in scan data corresponding to each of said spaced-apart sensors, to determine a compensation to be applied to said scan data before attempting to decode the plural-bit steganographic watermark information therefrom.